Space Weather Forecast

Issued on Tuesday, 12 December 2023 at 12:47 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: Chance of isolated Moderate flares, risk decreasing by Day 4 (15 Dec).

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar activity has been Low with the peak flare a modest Common-class flare at 12/0338 UTC from a region located near centre disc in the north. This region has become the most active on the disc and is magnetically complex. In total there are seven sunspot regions on the disc, with three regions having departed in the past 24 hours across the western limb. The largest region on the disc is now transiting the northwest quadrant. The smaller bipolar region to the south of this is the most active region on the disc and continues to develop. The other regions are currently relatively small and simple and are either stable or showing slight signs of decay.

No Earth-directed Coronal Mass Ejections (CMEs) were observed in available imagery. However, dimming events have been observed in the vicinity of AR3514 associated with Common-class flares and are yet to be analysed. A filament lift-off from the southwest disc around 12/0900 UTC may have produced a CME but is not yet visible on available imagery.

Solar Wind / Geomagnetic Activity: Solar winds were at slow-ambient levels. Wind speeds as measured were initially around 360 km/s, but declined gradually to around 310 km/s around 11/1830 UTC. Winds inclined slightly from 12/0550 UTC, returning to 340km/s. The Total Interplanetary Magnetic Field (Bt) was mostly weak, while the north-south component (Bz) varied weakly. The wind parameters suggest that there may be some weak enhancement from a fast stream from a coronal hole. Geomagnetic activity was Quiet (Kp 0-1).

Energetic Particles / Solar Radiation: The count rate of energetic particles remained at background levels with no solar radiation storms observed.

Four-Day Space Weather Forecast Summary

Solar Activity: Generally Low solar activity is expected to continue, with a chance or slight chance of isolated M-flares. These are most likely to emanate from regions in the northwest quadrant and a region initially at the southwest limb.

Solar Wind / Geomagnetic Activity: There are no Earth-directed Coronal Mass Ejections (CMEs) currently expected in the forecast period. However, there are a number of recent features yet to be analysed as imagery becomes available.

Solar winds are most likely to continue at background levels Days 1-2 (12-13 Dec) before the onset of a HSS during Day 3 (14 Dec). However, confidence is low in timing and peak wind speeds due to the non-persistent nature of this feature, but slightly elevated winds are expected, possibly reaching elevated levels.

The current Quiet (Kp 0-2) geomagnetic activity is likely to continue until the a stream of fast solar winds arrives, which is anticipated to be on Day 3 (14 Dec). Unsettled to Active conditions

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are then likely, with a very slight chance of an isolated G1/Minor Geomagnetic Storm interval (Kp 5), but this is considered a low probability at this stage.

Energetic Particles / Solar Radiation: The count rate of energetic particles is forecast to remain at background levels with only a very slight chance of rising towards the S1/Minor Radiation Storm threshold should any significant flares occur from the two regions in the northwest quadrant, or the region that has recently departed beyond the southwest limb. This risk decreases as the active region that recently passed across the southwest limb rotates further away from the visible disc during Day 1 (12 Dec).

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Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	1	5	10	5
Strong	G3	No	1	1	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	No	35	30	30	20
Very Active	R3 to R5 X	No	5	1	1	1

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	No	10	5	5	5
Very Active	≥ S3 *	No	1	1	1	1

* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)

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